ASSESSMENT OF MARINE TURTLES IN AN AREA OF THE SOUTHERN INDIAN RIVER LAGOON SYSTEM, FLORIDA
September 1998 - June 1999

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NMFS Permit # 1144

INTRODUCTION

The Indian River Lagoon System (IRLS), located between the Ponce de Leon Inlet and the Jupiter Inlet on the east coast of Florida, teems with a diverse array of marine life and provides suitable habitat for immature loggerhead (*Caretta caretta*) and green sea turtles (*Chelonia mydas*). While studies of these turtles have been conducted in the northern region of the IRLS (Ehrhart and Yoder, 1976; Ehrhart and Yoder, 1978; Mendonca and Ehrhart, 1982; Ehrhart, 1983; Ehrhart, 1984; Witherington and Ehrhart, 1989; Schroeder et al., 1990) and in the central region of the IRLS (Ehrhart, 1985; Ehrhart and Witherington, 1986; Luepschen and Ehrhart, 1987; Ehrhart and Redfoot, 1992; Redfoot et al., 1992; Ehrhart et al., 1996, Ehrhart et al., 1999), there has been no study focused on the marine turtles utilizing the southern region of the lagoon. Without an investigation of marine turtles in the southern region of the lagoon the overall assessment of the marine turtle population utilizing the IRLS remains incomplete. This report provides a preliminary assessment of an aggregation of sea turtles utilizing a portion of the southern region of the IRLS.

Due to the lack of any baseline data concerning marine turtles in the southern IRLS it was necessary to develop an open water net capture and release program similar and comparable to studies ongoing in other regions of the lagoon. The main purpose of this study was to characterize the population of marine turtles that utilize the southern IRLS. When developing this project we set out to answer four fundamental questions:

1. What are the population dynamics of marine turtles utilizing the southern IRLS?

2. Is fibropapillomatosis prevalent and at what rates does it occur in the southern IRLS?

3. Is there any mixing between marine turtles inhabiting the lagoon and marine turtles inhabiting the nearshore ocean environment?

4. Is there any mixing of marine turtles between regions within the IRLS?

The area of the IRLS surrounding the Ft. Pierce Inlet was selected as a study site and a permit proposal was drafted and submitted to the National Marine Fisheries Service (NMFS). NMFS approved the proposal and a permit was granted in June of 1998. After securing the needed equipment, netting effort began in September 1998. This report documents the activities associated with net capture and release of marine turtles in the southern IRLS between September 1998 and June 1999.

MATERIALS AND METHODS

In the original proposal to NMFS two study sites were to be investigated; one site north of the Ft. Pierce Inlet and one site south of the inlet. To date all netting effort has been conducted in an area south of the Ft. Pierce Inlet. This is primarily due to difficulty in finding a suitable study site north of the inlet, where turtles have consistently been sighted. Information from local fishermen describing an aggregation of turtles in a remote area north of the inlet was investigated and resulted in few sightings. This area will be investigated again in the future.

Our current study site is located in the IRLS east of the Intracoastal Waterway approximately 2 km south of the Ft. Pierce Inlet between 27^0 25.5' and 27^0 26'N, in an area known on nautical charts as Jenning's Cove (Figure 1). The water depth in this cove is typically between 1.0 and 2.5 meters with the exception of a deep dredge hole 150 meters west of the east shoreline. The depth in this section ranges between 6.0 and 7.5 meters and is not noted on any of the charts of the region. It lies 2 km south of the inlet and extends approximately 500 meters north to south and 250 meters east to west. Netting effort was focused primarily in this area of Jenning's Cove.

This study site experiences heavy recreational boat traffic, due to it's proximity

to a well developed boat ramp (Jaycee Park) and the inlet. The east shore of Jenning's Cove is mostly developed, with condominiums and private homes stretching along the shoreline. Additionally, there is a sewage treatment plant approximately 2.5 km northwest of the study site. Large stands of red (*Rhizophora mangle*), black (*Avicennia germinans*) and white (*Laguncularia racemosa*) mangroves line the south bank of the cove in an area known as Hook Point. Sea grass beds, primarily consisting of shoal grass (*Halodule wrightii*), are commonly found in the shallower water of the cove, while drift algae, primarily *Gracilaria sp.*, is found throughout the study area.

In this study, turtles were captured by deploying a large mesh tangle net from a 14' Jon boat. The net measures 100 meters long by 5 meters deep and consists of 40 cm stretch (knot to knot) multi-filament mesh. The mesh is suspended from a foam core braided polyethylene top line with large fixed bullet buoys spaced 2.5 meters apart. The bottom line consists of a small diameter lead core line. These dimensions are a slight departure from the original specifications listed in the permit proposal, but due to the unexpected depth at the study site slight modifications were made.

Once the net was fully deployed it was carefully monitored and the lead line was pulled hand over hand every 30 minutes. When turtles encountered the net and became entangled, they were quickly removed from the net and placed on the deck of the boat. Inconel #681 tags, supplied by NMFS, were applied to the trailing edge of both front flippers and a series of measurements were taken.

Measurements included straight standard carapace length (SSCL), straight minimum carapace length (SMCL), straight maximum carapace width (SMCW), straight midline plastron length (SMPL), curved standard carapace length (CSCL) and curved maximum carapace width (CMCW) as described by Pritchard et al.(1983). All straight-line measurements were taken with forestry calipers and curved measurements were taken with a flexible tape. In addition, turtles were weighed and photographs were taken dorsally and ventrally, after which the turtle

was released near the area of capture.

To categorize tumor severity of turtles with fibropapillomatosis, a tumor score sheet was used. Total tumor scores were used to describe the severity of the affliction and to put turtles into categories described in Work and Balazs (in press) where TS-0 = no tumors, TS-1 = lightly tumored, TS-2 = moderately tumored and TS-3 = heavily tumored. See Table 1 for parameters of these categories.

To determine the relative abundance of marine turtles at this study site the catch per unit effort (CPUE) was standardized using the formula found in Ehrhart et al. (1996). In this formula effort is expressed in net kilometer hours (one kilometer of net fished for one hour) and the CPUE was calculated using the formula C/(L*T). Where C = the number of turtles captured, L = the length of net fished, and T = the amount of time the net was fished.

The CPUE data collected from this study were used to determine seasonal fluctuations in marine turtle abundance in our southern lagoon study area. CPUE data for fall (September 22 - December 21), winter (December 22 - March 21) and spring (March 22 - June 21) are presented in Table 2.

No data for the summer season were recorded due to the start date of this project and the due date of this report. This project is currently ongoing and data for the summer season will be presented in a future report.

RESULTS

Between September 1998 and June 1999, 47 green turtles (including 3 recaptures) and 5 loggerhead turtles (including 1 recapture) were captured with tangle nets at the Jenning's Cove study site. Nets were set in this study site on 18 different days for a total of 106.06 hours. Total netting effort expressed in kilometer net hours was 10.606

Netting effort was 3.545 km/net hours for the fall, 2.839 km/net hours in the

winter and 4.222 km/net hours in the spring (Table 2). Overall CPUE was calculated at 4.90 turtles per km/net hour. Seasonally the CPUE was calculated at 3.10 turtles per km/ net hour in the fall, 5.64 turtles per km/net hour in the winter and 5.92 turtles per km/net hour in the spring.

LOGGERHEADS

Overall loggerhead CPUE was 0.47 turtles per km/net hour and seasonally was 0.56, 0.00 and 0.71 turtles per km/net hour for fall, winter and spring; respectively (Figure 2). Curve standard carapace lengths (CSCL) for the four individual loggerheads captured were between 61.3 and 102.0 cm with a mean of 81.1 cm $\pm$ 18.0 SD. Morphometric data for all loggerhead turtles captured during the time period of this report are presented in Table 3.

Only over-the-curve measurements were taken for two individuals due to their large size and our inability to safely bring them into the boat. Both of these turtles were considered adult males due to the length of their carapaces (102.0 and 89.0 cm CSCL) and the length of their tails, which extended well beyond the posterior carapace.

One loggerhead recapture event was recorded during the time period of this report. An individual which was captured on April 24, 1999 at 0751 was recaptured the same day at 1315 (Table 4). Evidence of fibropapallomatosis was not visually identified on any of the loggerheads captured.

GREEN TURTLES

During netting activities at the Jenning's Cove study site green turtles were encountered much more frequently than loggerheads. Overall CPUE for green turtles was 4.43 turtles per km/net hour (Table 2). The CPUE calculated seasonally was 2.54, 5.64 and 5.21 turtles per km/net hour for fall, winter and spring; respectively (Figure 3).

Straight standard carapace lengths (SSCL) for 42 individual green turtles

captured at this site ranged from 37.1 to 74.8 cm (Figure 4, Table 5). The mean size for these 42 individuals was 53.1 cm ± 9.7 SD. Curved standard carapace lengths (CSCL) for 44 individual green turtles ranged from ~~30.9~~ 39.2 to ~~74.4~~ 79.3 cm, with a mean of 56.4 cm ± 10.4 SD. Morphometric data for all green turtles captured during the time period of this report are presented in Table 5.

Fibropapillomatosis was visually present in 72.3% of the green turtles captured at the Jenning's Cove site. Seasonal rates of this disease were 88.8% for the fall, 53.3% for the winter and 80.0% for the spring. Turtles were categorized by tumor load and put into four descriptive groups as noted above. Of the 47 green turtles captured, 7 were severely tumored (TS3), 16 moderately tumored (TS2), 11 lightly tumored (TS1) and 13 showed no visible tumors (TS0) (Figure 5).

Throughout the time period of this report three green turtles were recaptured at the Jenning's cove study site. Days at large for these three turtles ranged from 0 to 139 days (Table 4). To date none of the turtles tagged and released at this site have been recovered by any other researchers. Additionally, no turtles tagged by other researchers were encountered during our netting activities .

DISCUSSION

While there are no baseline studies of marine turtles in the southern IRLS, there is a historical reference citing Ft. Pierce as one of the three primary green turtle fisheries in the IRLS (Bryce, 1897) . Sebastian to the north of Ft. Pierce and Eden to the south were the two other areas where the turtle fishery was carried out. Data from 1895 indicates that 4 boats using 40 nets pursued the turtle fishery in the Ft. Pierce area of the lagoon. This was more than was used in Sebastian and Eden combined. Even at that time, when the turtle fishery was in decline, the combined landing records from Ft. Pierce and Eden exceeded the combined total of all other areas in the IRLS (Bryce, 1897). By the early 1900's the turtle fishery in the lagoon had declined to the point of collapse. This historical background information and

discussions with former gillnet fishermen led to the selection of Ft. Pierce as a study area.

Due to time constraints on the primary permitees, effort targets for this project were set at modest levels. Effort targets of 2.0 km net/hours per season were exceeded during the last three seasons of this permit period. The first season of the permit period was spent making observational trips into the lagoon to identify potential study sites.

The CPUE rates recorded for each of the three seasons covered in this report were not statistically tested due to insufficient sample sizes, but the low of 3.10 turtles per km/net hour in the fall is notable. This low CPUE may have been the result of study site trial and error. In the fall, nets were set in different areas of Jenning's Cove. While turtles were seen throughout the cove, strong currents and build up of drift algae made netting in certain areas virtually impossible. Netting activity eventually was narrowed down to a long deep dredge hole where currents were minimal and drift algae was negligible.

After finding a suitable netting site within the cove, CPUE rates began to increase. Whether this is a function of location or seasonal variation in abundance is unknown at this time. CPUE rates were greater during the winter and spring seasons and on three occasions netting activity had to be curtailed, because the number of turtles captured exceeded the boat's limited capacity. While any sweeping statements about marine turtle abundance in this region of the lagoon would be premature, the initial data presented here are encouraging.

Green turtles captured at the Jenning's Cove site were noticeably larger than green turtles being studied in other areas within and around the IRLS. The mean straight standard carapace length of 53.1 cm of green turtles captured in this study, is over 10.0 cm larger than that of green turtles found in the lagoon near Sebastian Inlet (40.7 cm; Ehrhart et al, 1996). The mean of 53.1 cm is also considerably larger than that reported for green turtles found in the nearshore environment of the Atlantic coast of Hutchinson Island (39.6 cm; Bresette et al., 1998) and Sebastian (41.1 cm;

Ehrhart et al., 1996). This discrepancy in sizes within and around the continuous habitat of the IRLS, may be an artifact of our relatively small sample size. Another possibility is that this area, in close proximity to a major inlet, may serve as a staging area for green turtles approaching subadult size that are preparing to advance to other developmental habitats. Regardless, this bears watching in the future.

The fibropapilloma rate of 72.3% found in green turtles at Jenning's Cove is consistent with the rate found in green turtles in the central region of the lagoon (70.0%; Ehrhart et al., 1999). These rates are in stark contrast to the rates reported at two nearshore Atlantic coast study sites. South of Sebastian inlet rates were 0.0% from 1989 through 1996 and 8.0% from September 1997 through August 1998 (Ehrhart et al., 1999). The St. Lucie Nuclear Power Plant, 13 km south of the Ft. Pierce Inlet reports a 4.0% fibropapilloma rate in green turtles entrained with ocean cooling water (Quantum Resources, unpub. data). To find that this disease is at epizootic proportions in yet another area of the lagoon, while just to the north and south of our study site, on the Atlantic Coast, rates of this disease are at minimal levels, bolsters the hypothesis that there are environmental co-factors enabling proliferation of this disease in the lagoon.

Despite the frequency of this disease among green turtles at the Jenning's Cove site over 65.0% of all green turtles captured were recorded as being "fat". Although weight condition is a subjective observation, these turtles were still more corpulent than most of the green turtles observed at the power plant at Hutchinson Island (Quantum Resources, unpub. data). These turtles also appear heavier than those found in the lagoon in Sebastian, according to UCF personnel accompanying us on one of our netting trips. In the future, when more data are collected, a regression between straight length and weight will be performed to determine if there are any significant differences in weights between regions.

Loggerheads were captured infrequently during the time period of this report and were not nearly as abundant as green turtles in Jenning's Cove. However, loggerheads were spotted in the area on almost every trip into the lagoon. The

capture of two adult male loggerheads on the same day and recapture of one of the individuals later that same day is notable. During the late spring, adult loggerheads were commonly observed in the lagoon. More data are needed to statistically assess the relative abundance and size structure of loggerheads utilizing this region of the lagoon.

The lack of any tag returns and the scarcity of recaptures precludes any assessment of growth rate, site fidelity or movement of the marine turtles in this region.

While the results presented in this report are preliminary, they do begin to shed light on an aggregation of turtles that had not been studied. However, to fully assess the marine turtles utilizing the southern IRLS, other study sites to the south of Jenning's Cove should be examined. This project will continue to focus effort on the Jenning's Cove area and as it evolves will attempt to include other study areas within the southern region of the lagoon. Clearly, this region of the lagoon supports a large aggregation of marine turtles and a more comprehensive study is warranted.

ACKNOWLEDGEMENTS

Special thanks to Dr. Ehrhart and Dean Bagley of the University of Central Florida (UCF), for many encouraging discussions and for their willingness to share data from the lagoon, which was essential in the development of this project. Thanks also to Carrie Crady of Ecological Associates Inc., Karen Holloway, Karen Frutchey of UCF, Chris Koepple, Beth Morford, Kristin Fick of the Florida Department of Environmental Protection and Wanda Bresette. Without their assistance, half of the netting trips presented in this report would not have been possible. Special thanks to Erik Martin of Ecological Associates Inc. for his time and comments in reviewing this report.

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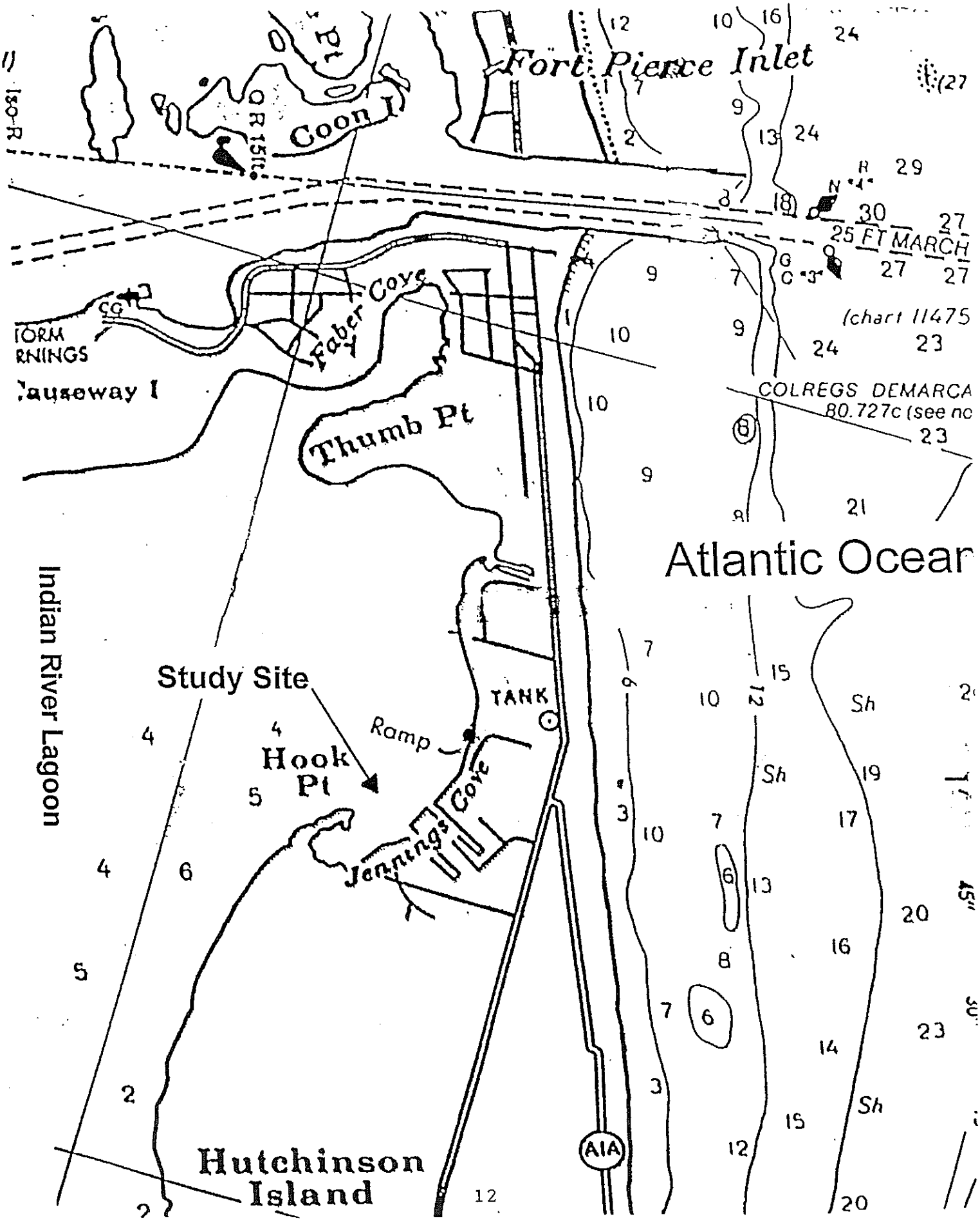
Figure 1. Jenning's Cove study site, Indian River Lagoon System Florida.



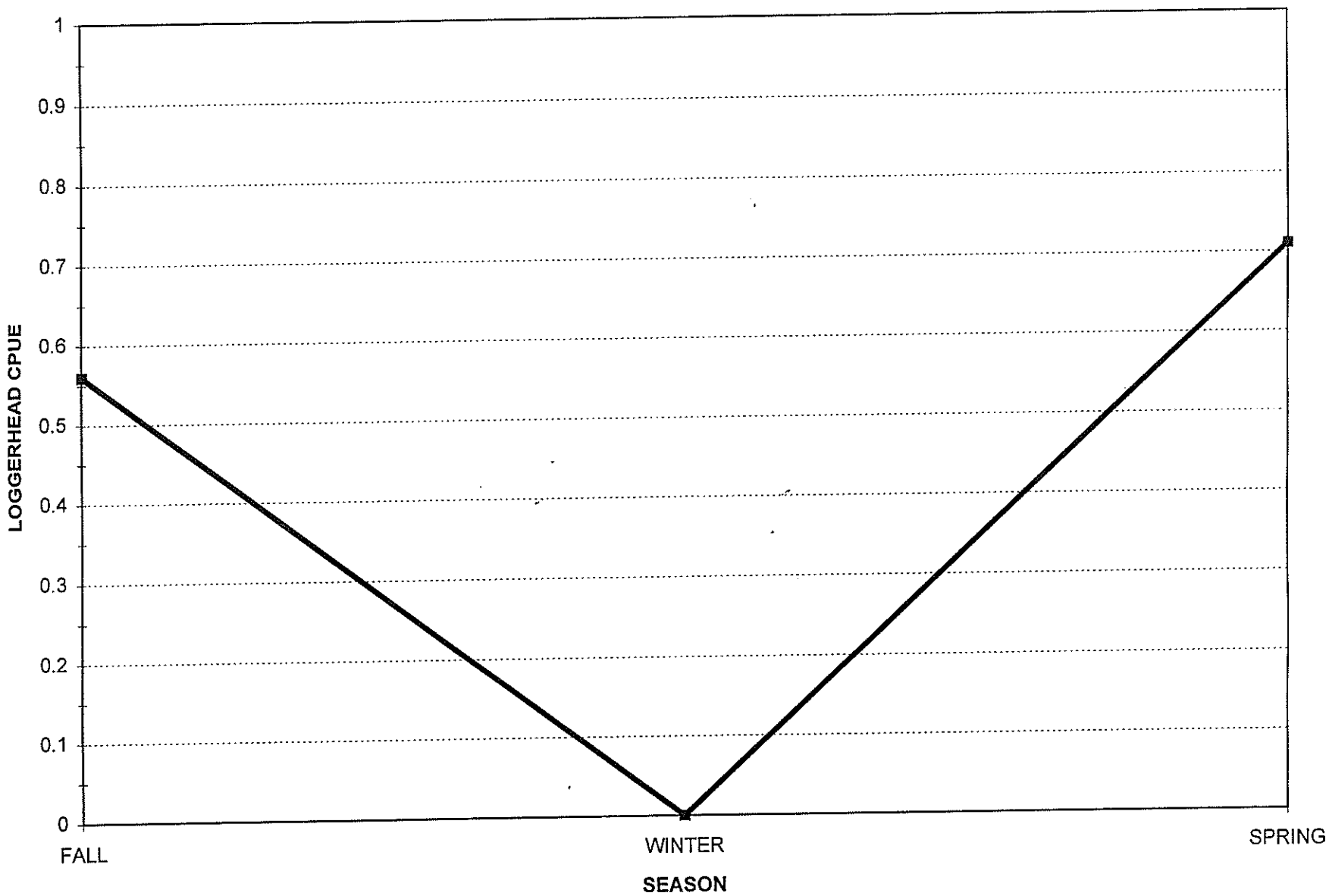


Figure 2. Seasonal catch per unit effort (CPUE) rates for loggerheads at Jenning's Cove, Indian River Lagoon System, Florida, September 1998 - June 1999.

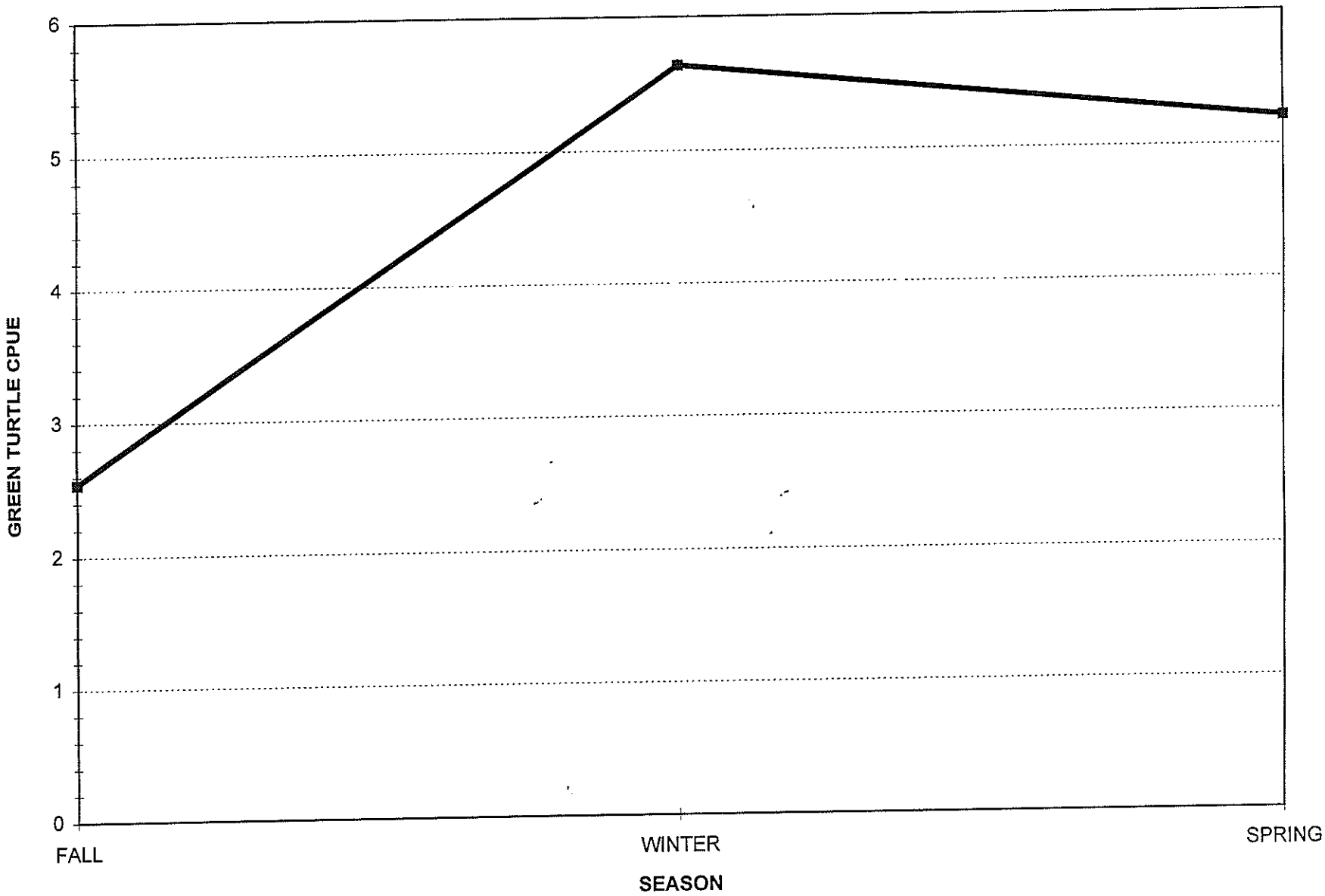


Figure 3. Seasonal catch per unit effort (CPUE) rates for green turtles at Jenning's Cove, Indian River Lagoon System, Florida, September 1998 - June 1999

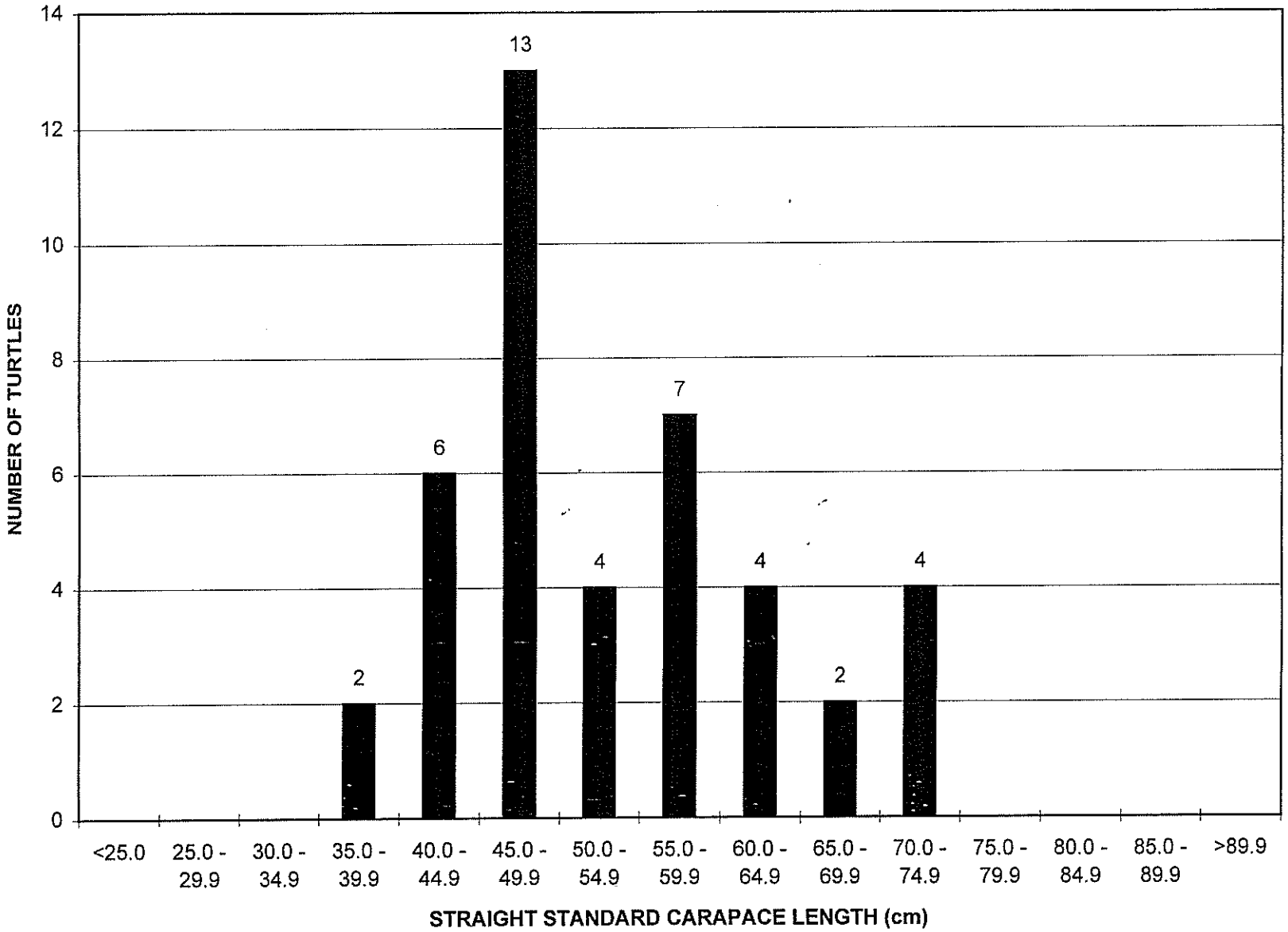


Figure 4. Size frequencies of green turtles at Jenning's Cove, Indian River Lagoon System, Florida. September 1998 - June 1999.

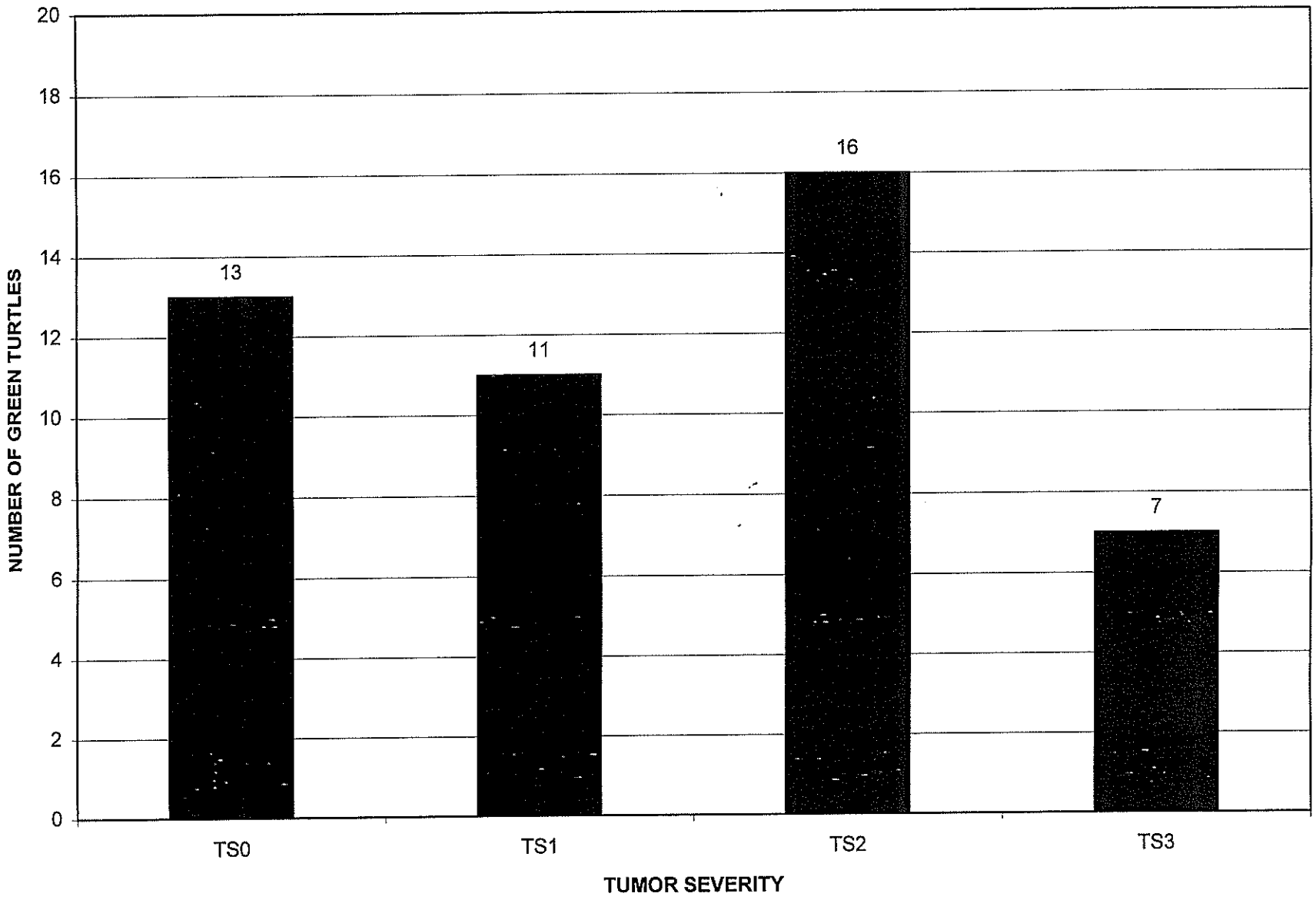


Figure 5. Number of green turtles at Jenning's Cove, Indian River Lagoon System, Florida, placed in categories of tumor severity. September 1998 - June 1999.

Table 1. Numbers of tumors of each size class (A,B,C and D) used for placement into a particular Tumor Score category for turtles with fibropapillomatosis. Taken from Work and Balazs (in press).

		Tumor Score			
	Tumor size class	TS = 0	TS = 1	TS = 2	TS = 3
A	Detectable < 1cm	0	1 - 5	> 5	> 5
B	1 - 4 cm	0	1 - 5	> 5	> 5
C	4 - 10 cm	0	0	1 - 3	> 4
D	> 10 cm	0	0	0	1

Table 2. Catch per unit effort (CPUE) for each season and overall at Jenning's Cove, Indian River Lagoon System, Florida. September 1998 - June 1999.

Season	Hours	Kilometer Net Hours	CC Captures	CM Captures	CC CPUE	CM CPUE	Total CPUE
Fall							
9/27/98	6.12	0.612	0	1	0.00	1.63	1.63
10/8/98	7.10	0.710	0	2	0.00	2.82	2.82
10/30/98	8.45	0.845	2	3	2.37	3.55	5.92
11/12/98	7.05	0.705	0	1	0.00	1.42	1.42
11/21/98	6.73	0.673	0	2	0.00	2.97	2.97
Total	**35.45**	**3.545**	**2**	**9**	**0.56**	**2.54**	**3.10**
Winter							
1/1/99	5.18	0.518	0	0	0.00	0.00	0.00
1/30/99	4.52	0.452	0	1	0.00	2.21	2.21
2/12/99	5.48	0.548	0	3	0.00	5.47	5.47
2/28/99	3.08	0.308	0	0	0.00	0.00	0.00
3/18/99	5.73	0.573	0	7	0.00	12.22	12.22
3/19/99	4.40	0.440	0	5	0.00	11.36	11.36
Total	**28.39**	**2.839**	**0**	**16**	**0.00**	**5.64**	**5.64**
Spring							
3/27/99	7.07	0.707	0	3	0.00	4.24	4.24
4/14/99	8.67	0.867	0	4	0.00	4.61	4.61
4/24/99	8.43	0.843	3	6	3.56	7.12	10.68
5/20/99	6.28	0.628	0	2	0.00	3.18	3.18
5/29/99	3.87	0.387	0	3	0.00	7.75	7.75
6/12/99	6.02	0.602	0	2	0.00	3.32	3.32
6/16/99	1.88	0.188	0	2	0.00	10.64	10.64
Total	**42.22**	**4.222**	**3**	**22**	**0.71**	**5.21**	**5.92**
Overall	**106.06**	**10.606**	**5**	**47**	**0.47**	**4.43**	**4.90**

CM = *Chelonia mydas*
CC = *Caretta caretta*

Table 3. Loggerhead captures (excluding recaptures) at Jenning's Cove, Indian River Lagoon System, Florida, September 1998 - June 1999.

TAG NUMBER	DATE	SMCL (cm)	SSCL (cm)	CSCL (CM)	CMCW (cm)	SMCW (cm)	SMPL (cm)
XXC007/XXC008	10/30/98	56.3	57.1	61.3	54.2	46.3	44.3
XXC009/XXC010	10/30/98	66.3	67.2	72.0	65.4	54.1	51.8
XXC068/XXC069	4/24/99			102.0			
XXC070/XXC071	4/24/99			89.0			

Number of Individuals = 4

n	2	2	4	2	2	2
Mean	61.3	62.2	81.1	59.8	50.2	48.1
Median			80.5			
Standard Deviation	7.1	7.1	18.0	7.9	5.5	5.3

SMCL = Straight Minimum Carapace Length
SSCL = Straight Standard Carapace Length
CSCL = Curved Standard Carapace Length
CMCW = Curved Maximum Carapace Width
SMCW = Straight Maximum Carapace Width
SMPL = Straight Midline Plastron Length

Table 4. Green and loggerhead turtle recapture events at Jenning's Cove, Indian River Lagoon System Florida. September 1998 - June 1999.

SPECIES	TAG NUMBER	FIRST CAPTURE DATE	RECAPTURE DATE	SSCL (cm)	CSCL (cm)	DAYS AT LARGE	RECAPTURE LOCATION
Chelonia mydas	XXC011/XXC012	10/30/98	3/18/99	51.0	54.8	139	Jenning's cove
Chelonia mydas	XXC051/XXC052	3/19/99	4/14/99	49.4	52.0	32	Jenning's cove
Chelonia mydas	XXC078/XXC079	4/24/99	4/24/99	61.9	65.4	0	Jenning's cove
Caretta caretta	XXC070/XXC071	4/24/99	4/24/99		89.0	0	Jenning's cove

Table 5. Green turtle captures (excluding recaptures) at Jenning's Cove, Indian River Lagoon System Florida, September 1998 - June 1999.

TAG NUMBER	DATE	SMCL (cm)	SSCL (cm)	CSCL (cm)	CMCW (cm)	SMCW (cm)	SMPL (cm)	WEIGHT (kg)	PAP'S	# OF TUMORS
XXC000/XXC001	9/27/98	53.0	53.3	57.6	49.2	41.5	44.3		Yes	1
XXC002/XXC003	10/8/98	55.8	56.1	60.0	52.8	46.2	47.4	25.4	Yes	2
XXC005/XXC006	10/8/98	46.6	47.0	49.9	43.1	37.1	38.8	14.1	Yes	12
XXC011/XXC012	10/30/98	49.1	49.7	53.5	46.3	38.7	41.2	20.4	Yes	45
XXC014/XXC015	10/30/98	41.1	41.6	43.2	36.3	32.5	34.1		Yes	26
XXC016/XXC017	10/30/98	41.2	41.5	43.0	38.0	32.0	34.0		Yes	32
XXC018/XXC019	11/12/98	57.1	57.8	60.5	54.0	45.5	49.7	26.3	Yes	6
XXC020/XXC021	11/21/98			43.2	37.4				Yes	16
XXC022/XXC023	11/21/98			67.1	55.5				No	
XXC024/XXC025	1/30/99	48.2	48.4	50.9	45.2	39.1	40.0		Yes	34
XXC026/XXC027	2/12/99	45.8	46.3	49.5	41.2	36.5	38.1	12.9	Yes	2
XXC028/XXC029	2/12/99	50.6	50.8	53.4	48.7	41.1	44.5	18.4	Yes	24
XXC030/XXC031	2/12/99	70.2	70.8	75.0	61.0	53.2	58.7		Yes	7
XXC032/XXC032	3/18/99	74.4	74.8	79.3	70.1	56.2	61.8		Yes	30
XXC034/XXC035	3/18/99	60.7	60.9	63.8	56.3	48.4	50.7		No	
XXC036/XXC037	3/18/99	50.7	51.5	54.3	48.9	42.7	43.7		No	
XXC038/XXC039	3/18/99	65.7	66.2	70.6	61.8	51.8	55.3		No	
XXC041/XXC042	3/18/99	58.2	59.5	63.2	53.3	45.8	48.6		No	
XXC043/XXC044	3/18/99	54.7	55.3	59.1	52.5	43.7	45.7		Yes	20
XXC045/XXC046	3/19/99	61.3	61.4	65.8	57.7	46.8	48.1		No	
XXC047/XXC048	3/19/99	57.4	57.6	61.6	53.9	44.1	47.1		No	
XXC049/XXC050	3/19/99	40.7	41.2	50.1	50.4	37.6	37.1		No	
XXC051/XXC052	3/19/99	48.7	49.4	52.4	44.2	38.9			Yes	23
XXC053/XXC054	3/19/99	66.6	67.3	72.4	60.5	51.6	53.2		Yes	12
XXC055/XXC056	3/27/99	48.9	48.9	51.5	44.0	47.6	40.7	13.6	Yes	17
XXC057/XXC058	3/27/99	46.0	46.4	49.5	45.4	39.4	39.7	15.4	Yes	51
XXC059/XXC060	3/27/99	37.7	38.1	39.8	33.0	28.7	30.6	7.3	Yes	2
XXC061/XXC062	4/14/99	72.4	73.0	78.2	64.9	52.8	60.6	55.3	Yes	29
XXC063/XXC064	4/14/99	36.9	37.1	39.2	32.2	28.3	31.0	5.9	Yes	45
XXC065	4/14/99	44.3	44.8	47.7	40.0	35.0	37.8	10.0	Yes	69
XXC066/XXC067	4/24/99	57.4	57.9	61.0	52.0	42.7	45.4		No	
XXC072/XXC073	4/24/99	43.1	43.7	46.7	41.3	34.1	38.3	10.0	Yes	8
XXC074/XXC075	4/24/99	46.1	46.3	48.4	40.6	35.7	39.6		Yes	20
XXC076/XXC077	4/24/99	48.5	49.1	52.0	46.2	40.7	40.7	16.3	No	

Table 5. (cont.)

TAG NUMBER	DATE	SMCL (cm)	SSCL (cm)	CSCL (cm)	CMCW (cm)	SMCW (cm)	SMPL (cm)	WEIGHT (kg)	PAP'S	# OF TUMORS
XXC078/XXC079	4/24/99	61.2	61.9	65.4	54.2	45.6	50.4	25.4	No	
XXC080/XXC081	5/20/99	45.1	45.5	49.6	43.8	35.6	38.8	12.7	Yes	2
XXC082/XXC083	5/20/996	60.1	61.9	66.9	53.8	46.1	49.5	31.7	Yes	21
XXC084/XXC085	5/29/99	70.2	70.2	75.0	66.0	55.5	58.2	47.6	No	
XXC086/XXC087	5/29/99	48.7	49.3	52.1	45.5	39.1	40.9	15.4	Yes	38
XXC088/XXC089	5/29/99	52.6	52.7	56.2	48.6	42.0	44.4	22.2	Yes	1
XXC090/XXC091	6/12/99	46.4	46.9	50.1	43.3	37.2	40.0	15.0	Yes	4
XXC092/XXC093	6/12/99	42.4	43.1	44.5	37.0	32.9	34.7	13.6	Yes	40
XXC094/XXC095	6/16/99	44.2	45.8	47.9	39.3	34.3	39.1	17.2	Yes	36
XXC096/XXC097	6/16/99	57.2	57.4	61.1	54.0	45.1	48.0	31.7	Yes	13
Number of individuals = 44										
	n	42	42	44	44	42	41	24		32
	Mean	52.6	53.1	56.4	48.7	41.7	44.2	20.2		
	Median	49.9	50.3	53.5	48.7	41.3	43.7	15.9		
	Standard Deviation	9.7	9.7	10.4	8.9	7.0	7.8	11.9		

SMCL = Straight Minimum Carapace Length
SSCL = Straight Standard Carapace Length
CSCL = Curved Standard Carapace Length
CMCW = Curved Maximum Carapace Width
SMCW = Straight Maximum Carapace Width
SMPL = Straight Midline Plastron Length